General

Guideline Title

Guideline for radiation safety.

Bibliographic Source(s)

Burlingame BL, Conner RL. Guideline for radiation safety. In: 2015 Guidelines for Perioperative Practice. Denver (CO): Association of periOperative Registered Nurses (AORN); 2015 Jun. p. e1-e33. [248 references]

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Note from the Association of periOperative Nurses (AORN): The original guideline document provides guidance for preventing patient and health care worker injury from ionizing radiation exposure during therapeutic, diagnostic, or interventional procedures performed in the perioperative environment. Guidance for low-dose-rate and high-dose-rate brachytherapy using ionizing radiation is included. The guidance applies to patients, perioperative team members, and the caregivers of patients who receive brachytherapy or other radioactive therapeutic implants.

I. A radiation safety program must be established in all facilities and health care organizations in which the potential for diagnostic or therapeutic radiation exposure exists.
II. The perioperative team should implement measures to minimize the patient's exposure to radiation.
III. Occupational exposure to radiation should be minimized.
IV. Personnel with a known or suspected pregnancy must restrict the occupational radiation dose as described in local, state, and federal regulations.
V. Shielding devices, including architectural (i.e., fixed) shielding, equipment-mounted or mobile shields, and personal protective devices should be used with all sources of radiation.
VI. Radiation monitors or dosimeters must be worn by personnel as required by regulatory agencies.
VII. The principles of time, distance, and shielding should be followed by personnel handling therapeutic radionuclides and by personnel caring for patients who have received therapeutic radionuclides.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Any condition requiring the use of therapeutic, diagnostic or interventional radiation procedures

Guideline Category

Management

Prevention

Clinical Specialty

Nursing

Radiation Oncology

Radiology

Intended Users

Advanced Practice Nurses

Hospitals

Nurses

Guideline Objective(s)

- To provide guidance for preventing patient and health care worker injury from ionizing radiation exposure during therapeutic, diagnostic, or interventional procedures performed in the perioperative environment
- To provide guidance for low-dose-rate and high-dose-rate brachytherapy using ionizing radiation

Target Population

Patients, perioperative team members, and the caregivers of patients who receive brachytherapy or other radioactive therapeutic implants, or undergo therapeutic, diagnostic or interventional procedures utilizing ionizing radiation

Interventions and Practices Considered

1. Establishment of a radiation safety program in all facilities with a potential for diagnostic radiation exposure
2. Implementation of measures to minimize the patients' and occupational exposure to radiation
3. Restriction of the occupational health dose as described in local, state and federal regulations for personnel with known or suspected pregnancy
4. Shielding devices
    - Architectural (fixed) shielding
    - Equipment mounted
    - Mobile shields

- Personal protective devices

5. Wearing of radiation monitors or dosimeters

Major Outcomes Considered

- Dose monitoring
- Patient outcomes
- Radiation dose
- Adverse effects of radiation (radiation burns, radiation dermatitis)

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

The authors reviewed international articles from the 1970s, articles published between 1990 and 2008 identified in a MEDLINE® search, and additional articles acquired from citations in the literature.

Evidence Review

A medical librarian conducted a systematic search of the MEDLINE® and Cumulative Index to Nursing and Allied Health Literature (CINAHL®) databases and the Cochrane Database of Systematic Reviews for meta-analyses, systematic reviews, randomized controlled trials (RCTs) and non-randomized trials and studies, case reports, letters, reviews, and guidelines. The librarian also searched the Scopus® database, although not systematically. The search was limited to literature published in English from January 2006 through January 2014.

Search terms included *invasive procedures, interventional procedure, interventional radiography, interventional radiology, intraoperative radiotherapy, cardiac catheterization, heart catheterization, abdominal radiography, radiation, ionizing radiation, iodine radioisotopes, radioactive tracer, radiation safety officer, safety management, radiation safety procedures, risk assessment, occupational radiation dose, occupational diseases, occupational exposure, occupational health, occupational hazards, radioprotection, radiation protection, radiation safety precautions, protective clothing, protective gloves, protective devices, eye protective devices, goggles, glasses, lead shield, lead apron, leaded garment, equipment failure, radiation injuries, patient safety, radiation monitoring, radiopharmaceuticals, radioactive pollutants, radioactive waste, medical waste, medical waste disposal, radiation field, storage, handling, transport, hazardous waste, occupational accident, thermoluminescent dosimetry, dosimeter, radiometry, staff dose, fetus, fertility, gonads, pregnancy,* and *pregnancy outcomes*.

These terms were searched in combination with terms such as *healthcare facility, health care facility, ambulatory care facility, surgicenter, ambulatory surgery, outpatient surgery, operating room personnel, interventionalist, surgeon, nurse, anesthesiologist, anaesthesiologist, operator, operating room, operating theater, operating suite,* and *surgical suite*.

At the time of the search, the librarian established weekly alerts on the search topics and until July 2014, presented relevant results to the lead author. During the development of this document, the lead author also requested supplementary literature searches and additional literature that either did not fit the original search criteria or was discovered during the evidence-appraisal process. The time restriction was not considered in these subsequent searches. Relevant guidelines from government agencies and standards-setting bodies also were identified.

Inclusion criteria were research and non-research literature in English, complete publications, relevance to the key questions, and publication dates within the time restriction unless none were available. Excluded were non-peer-reviewed publications, literature that examined radiation safety measures that were determined to be beyond the scope of this document (e.g., columnation, methods to decrease fluoroscopy time), and literature

outside the time restriction when literature within the time restriction was available. Low-quality evidence was excluded when higher-quality evidence was available.

Excluded were non-peer-reviewed publications and studies that addressed moderate sedation, regional anesthesia, pediatric patients, or pregnant patients. Low-quality evidence was excluded when higher-quality evidence was available.

Number of Source Documents

In total, 1,397 research and non-research sources of evidence were identified for possible inclusion; of these, 248 were cited in the original guideline document. See Figure 1 in the original guideline document for a flow diagram of literature search results.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

I: Randomized controlled trial (RCT) or experimental study, systematic review of all RCTs

II: Quasi-experimental study, systematic review of quasi-experimental studies or combination of quasi-experimental and RCTs

III: Non-experimental studies, qualitative studies, systematic review of non-experimental studies, combination of non-experimental, quasi-experimental, and RCTs, or any or all studies are qualitative

IV: Clinical practice guidelines, position or consensus statements

V: Literature review, expert opinion, case report, community standard, clinician experience, consumer experience, organizational experience (quality improvement, financial)

Methods Used to Analyze the Evidence

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Articles identified by the search were provided to a project team that consisted of the lead author and four evidence appraisers. The lead author and the evidence appraisers reviewed and critically appraised each article using the Association of periOperative Registered Nurses (AORN) Research or Non-Research Evidence Appraisal Tools as appropriate. The literature was independently evaluated and appraised according to the strength and quality of the evidence. Each article was then assigned an appraisal score. The appraisal score is noted in brackets after each reference, as applicable.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The methodology of the research and non-research evidence used to support this guideline was critically evaluated by the authors for validity and generalizability to current practice. The collective evidence supporting each intervention within a specific recommendation was summarized, and the Association of periOperative Registered Nurses (AORN) Evidence-Rating Model was used to rate the strength of the collective evidence. Factors considered in the review of the collective evidence were the quality of the evidence, the quantity of similar evidence on a given topic, and the consistency of the evidence supporting a recommendation.

Rating Scheme for the Strength of the Recommendations

1: Strong Evidence: Interventions or activities for which effectiveness has been demonstrated by high quality evidence from rigorously-designed studies, meta-analyses, or systematic reviews, or rigorously-developed clinical practice guidelines

- Evidence from a meta-analysis or systematic review of research studies that incorporated evidence appraisal and synthesis of the evidence in the analysis.
- Supportive evidence from a single well-conducted randomized controlled trial (RCT).
- Guidelines that are developed by a panel of experts, that derive from an explicit literature search methodology, and include evidence appraisal and synthesis of the evidence.

1: Regulatory Requirement: Federal law or regulation.

2: High Evidence: Interventions or activities for which effectiveness has been demonstrated by evidence from:

- Good quality systematic review of RCTs
- High quality systematic review in which all studies are quasi-experimental or a combination of RCTs and quasi-experimental studies
- High quality quasi-experimental study
- High quality systematic review in which all studies are non-experimental or include a combination of RCTs, quasi-experimental, and non-experimental studies. Any or all studies may be qualitative.
- High quality non-experimental studies
- High quality qualitative studies
- Good quality clinical practice guideline, consensus or position statement

3: Moderate Evidence: Interventions or activities for which the evidence is has been demonstrated by evidence from:

- Good quality systematic review in which all studies are quasi-experimental or a combination of RCTs and quasi-experimental studies
- Good quality quasi-experimental study
- High or good quality literature review, case report, expert opinion, or organizational experience

4: Limited Evidence: Interventions or activities for which there are currently insufficient evidence or evidence of low quality

- Supportive evidence from a poorly conducted research study
- Evidence from non-experimental studies with high potential for bias
- Guidelines developed largely by consensus or expert opinion
- Non-research evidence with insufficient evidence or inconsistent results
- Conflicting evidence, but where the preponderance of the evidence supports the recommendation

5: Benefits Balanced with Harms: Selected interventions or activities for which the Association of periOperative Registered Nurses (AORN) Guidelines Advisory Board is of the opinion that the desirable effects of following this recommendation outweigh the harms

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

The Guideline for Radiation Safety has been approved by the Association of periOperative Registered Nurses (AORN) Guidelines Advisory Board. It was presented as a proposed guideline for comments by members and others. The guideline is effective June 15, 2015.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The literature was independently evaluated and appraised according to the strength and quality of the evidence. Each article was then assigned an appraisal score. The appraisal score is noted in brackets after each reference in the original guideline document, as applicable. Also see the original guideline document for the systematic review and discussion of evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Prevention of the stochastic (i.e., short term) and deterministic (i.e., long term) effects of radiation
- The benefits of using monitoring devices include knowledge of the levels of radiation exposure and being able to limit the dosage if the levels are nearing recommended maximum levels.
- Refer to the original guideline document for additional discussion of potential benefits of specific interventions.

Potential Harms

- The potential harms created by minimizing the patient's exposure to radiation include the creation of a poor quality image.
- Orthopedic strain caused by wearing a heavy lead apron for a prolonged period of time

Qualifying Statements

Qualifying Statements

- These recommendations represent the Association's official position on questions regarding optimal perioperative nursing practice.
- No attempt has been made to gain consensus among users, manufacturers, and consumers of any material or product.
- Compliance with the Association of periOperative Registered Nurses (AORN) guideline is voluntary.
- AORN's recommendations are intended as achievable and represent what is believed to be an optimal level of patient care within surgical and invasive procedure settings.
- Although they are considered to represent the optimal level of practice, variations in practice settings and clinical situations may limit the degree to which each recommendation can be implemented.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Mobile Device Resources

Staff Training/Competency Material

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Patient-centeredness

Safety

Identifying Information and Availability

Bibliographic Source(s)

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Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2015 Jun

Guideline Developer(s)

Association of periOperative Registered Nurses - Professional Association

Source(s) of Funding

Association of periOperative Registered Nurses (AORN)

Guideline Committee

Association of periOperative Registered Nurses (AORN) Guidelines Advisory Board

Composition of Group That Authored the Guideline

Lead Author: Byron L. Burlingame, MS, BSN, RN, CNOR, Perioperative Nursing Specialist, AORN Nursing Department, Denver, CO

Contributing Author: Ramona Conner, MSN, RN, CNOR, Editor-in-Chief, Guidelines for Perioperative Practice, AORN Nursing Department, Denver, CO

Team Members: Amy L. Halverson, MD, Associate Professor of Surgery, Northwestern University, Chicago, IL; Nathalie Walker, MBA, RN, CNOR, Metairie, LA; Jennifer Fencl, DNP, RN, CNS-BC, CNOR, Clinical Nurse Specialist, Cone Health, Greensboro, NC; Julia Thompson, PhD, RN, CNOR, CNS-CP, Administrative Director, Harris Health System, Houston, TX; Janice Neil, PhD, RN, CNE, Associate Professor, College of Nursing, East Carolina University, Greenville, NC

Financial Disclosures/Conflicts of Interest

No financial relationships relevant to the content of this guideline have been disclosed by the authors, planners, peer reviewers, or staff.

Guideline Status

This is the current release of the guideline.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Electronic copies: Available to subscribers from the Association of periOperative Nurses (AORN) Web site.

Print copies: Available for purchase from the AORN Web site.

Availability of Companion Documents

The following is available:

- Guideline for radiation safety evidence table. 2015. 40 p. Available from the Association of periOperative Nurses (AORN) Web site.

A guideline implementation document is available for purchase from the AORN Web site.

Documents related to the evidence rating model, hierarchy of evidence, and expanded appraisal tools are available from the AORN Web site.

In addition, an AORN Guidelines for Perioperative Practice eBook mobile app is available from the AORN Web site.

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on February 17, 2016. The information was verified by the guideline developer on March 30, 2016.

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